Bahan Textile Machinery Company

TEXTILE MACHINERY PARTS

GReEnvIlLe, sOurth cArOlInA

Compliments Of

L. C. Martin Drug Company

P. S. McCULLUM, Owner

OFFICIAL COLLEGE BOOK AND SUPPLY STORE

CLEMSON COLLEGE ▼ SOUTH CAROLINA

★ Serving Clemson Since 1908 ★
Contents

ARTICLES

DEDICATION ........................................... 2
CLOTH WITHOUT A LOOM .......................... 2
THE VALUE OF RESEARCH TO THE TEXTILE INDUSTRY .......................... 3
CHOOSE SYNTHETICS .................................. 4
PROFESSOR DUNLAP DOES CARD SPEED RESEARCH WORK .................. 5
TEXTILES IN THE WAR EFFORT ...................... 7
A PARTING WORD TO CLEMSON MEN ................ 8
MILL POWER SUPPLY ................................ 9
RAYON VS. COTTON IN TIRE CORD ................. 10
TEXTILE FACULTY MEMBERS CALLED INTO THE SERVICE .................. 11
THE EDITOR'S PAGE ................................ 12
PHI PSI ASSUMES PROMINENCE ON THE CAMPUS .................... 13
TEXTILE GRADUATES IN THE SERVICE ................ 14
THE MANUFACTURE OF TAPESTRIES .................. 16
USEFUL DATA ........................................ 20

INDEX TO ADVERTISERS

BAHAX TEXTILE MACHINERY ........................................ 2
J. E. SIRRENE & CO ........................................ 2
L. C. MARTIN DRUG CO ........................................ 2
ESSO DEALERS ........................................ 2
C. C. DuBOSE ........................................ 2
BODIFORD'S CLEANERS .................................... 2
HOKE SLOAN ........................................ 2
KEEVER STARCH CO ........................................ 2
RALPH E. LOPER CO ........................................ 2
AMERICAN CYANAMID & CHEM. CO .................... 2
PABST SALES COMPANY .................................. 2
GREENVILLE TEXTILE SUPPLY CO ...................... 2

EXECUTIVE STAFF

Editor-in-Chief, M. D. MOORE
Managing Editor, L. S. LIGON
Asst. Managing Editor, J. J. McCARTHY
Circulation Manager, D. F. ALLEN
Business Manager, C. A. REESE
Advertising Manager, C. P. CLANTON
Asst. Editor, B. A. CHESTOCHOWSKI

Photos by R. G. HUFFORD
Dedication

IT IS with pride, respect and admiration that we dedicate this issue of THE BOBBIN AND BEAKER to those of Clemson who have made the supreme sacrifice and to those who are now serving in the armed forces of our nation.

"Your flaming torch aloft we bear,
With burning heart an oath we swear
To keep the faith, to fight it through,
To crush the foe, or sleep with you
In Flanders Field."

Lt. R. E. Agnew           Lt. Henry Bacot
Lt. L. A. Groce           Lt. Raymond Sloan
Lt. D. W. Smith           Lt. Bill Brady
Pilot Officer W. B. Inabinet
Lt. J. W. Smith
J. H. Meadows

TO OLD GRADS

Due to the fact that we do not have a paid subscription list, we have been unable to secure a second class mailing permit. By offering a subscription rate, we will be able to mail the magazine at a much lower cost.

Fill in the blank below and return it at once.

However, to those who do not wish to subscribe, we plan to maintain the present mailing list.

SUBSCRIPTION BLANK

Find enclosed $1.00 for which send The Bobbin And Beaker for three years.

Signed

Box No. or St.

City and State

CLOTH WITHOUT A LOOM

A few months ago a new textile material was perfected by Johnson and Johnson Company of New Brunswick, New Jersey. This new product is quite unique in that it is made without the use of a loom or even a spinning process. Although the new material has been in production for several months, it is not very well known to the manufacturing or merchandising fields because the Army and the Navy have assumed control of its production in order to fill their needs. Consequently, it is not likely that Masslinn, as it is called by its producer, will be available to the public until after the war, or until production is so adjusted that the Army and Navy requirements can be fulfilled while the consumer's needs can be supplied simultaneously.

The new fabric is truly something revolutionary in the textile industry. It will no doubt be capable of being produced much cheaper than fabrics manufactured by conventional methods, because there is no weaving or spinning process. The cloth is made directly from the product of the card. The soft web issuing from the card is treated with an adhesive chemical which strengthens the soft web and enables it to cling together when handled. From the card the soft web is run through a rolling machine resembling a paper pulp machine. It comes out as a stronger, finer sheet of cloth.

The manufacturers are not permitted to disclose just what purpose the material is being used for by the Army and Navy, but its logical to assume that it is very desirable for surgical and medical cloth after considering some of its characteristics. Of course, it may have other uses, too. Masslinn is very light in weight, weighing only about one ounce per yard (14-16 yds. per lb.) as compared to about six and one-half yards per pound for cotton fabric of comparable size. It is very economical, the basic cost being about four cents per yard. It is easily sterilized, very absorbent, and much stronger when wet than when dry. The cloth can be produced at a rate ten times faster than that for ordinary loom production.

Masslinn will, undoubtedly, take a prominent place in the textile industry after the war by reason of its extremely economical production and its versatile possibilities. The method of manufacture makes it an unusual fabric and from it may result many novelty fabrics for the textile market. The producers say, however, that it will not come to the front immediately because its present tensile strength renders it unfit for clothing materials, or for fabrics which must wear for long periods.

—The Bobbin and Beaker—

Lt. W. E. Tarrant, Jr., former Professor of Weaving and Designing at Clemson, was called to active duty in September. Lt. Tarrant is now an instructor in Ground Forces, United States Army Air Forces, and is stationed at Ellington Field, Houston, Texas.
The Value of Research to the Textile Industry

By John T. Wigington, Director of Research
The Cotton-Textile Institute, Inc.

Never in the history of the cotton textile industry has been expressed such interest and enthusiasm in research as is shown today. The development of rayon, nylon, aralac, and other synthetic fibers, together with the fact that many important fibers such as silk, flax, jute, and sisal are no longer available, are two important factors which are stimulating the research work being conducted by the cotton breeders, ginners merchants, manufacturers and allied industries.

In an effort to meet the emergency needs of the nation, cotton manufacturers have found that many changes in their methods of selecting and processing cotton have been necessary to produce the quantity and quality of yarns and fabrics required for military purposes. The industry has consumed approximately 12 million bales of cotton during the past year, as compared with 61-2 to 7 million bales during a similar period of the First World War. This tremendous increase in production has been brought about with a third fewer active cotton spinning spindles than were in operation at that time. This accomplishment merits particular attention and demonstrates conclusively that research and technical skill have been largely responsible for this great feat.

The manufacturers of textile machinery, through their research and engineering departments, are aiding materially in the progress of cotton manufacturing. Equipment has been streamlined, speeded-up, refined and in many cases simplified. Briefly, these improvements include better opening, cleaning and blending machinery; better drafting, winding, spooling, warping, and weaving equipment.

The chemist and the chemical industries have pursued vigorously a program of research that has resulted in changes in the characteristics of the raw cotton fiber, in new dyes, new bleaching agents, mill...
Choose Synthetics

Guest Editorial . . . By C. W. Bendigo

Mr. Bendigo is at present connected with Judson Mills of Greenville, South Carolina, where he is in charge of the Technical and Engineering Department. He has been active in textiles all his life.

Mr. Bendigo began his career in textiles at the age of thirteen when he worked in a mill during his summer vacations from school. He attended Ursinus College in Pennsylvania and the University of North Carolina where he completed the course in Journalism. Mr. Bendigo has frequently written articles for "Textile World," "Rayon Textile Monthly," "Cotton," and "Textile Age." Last year he was invited to address the American Association of Textile Technologists on combination rayon yarns.

Mr. Bendigo was connected with Adams Millis Corporation in silk throwing until 1933 when he changed to rayon and assumed a position with Glen Raven "Silk" Mills. From 1935 to 1940 he held a position with Burlington Mills as superintendent of one of their High Point, North Carolina, plants. He joined Judson Millis in 1940 as assistant superintendent and has since been promoted to the position that he now holds.

To me the grass does not look greener in the other fellow's field. When asked for advice in regard to a vocation, I do not hesitate to recommend my own chosen field of synthetics—if the inquirer appears at all promising.

Note that I say synthetics, not rayon. It is true that rayon (acetate, viscose, cuprammonium) lead the field of synthetics at present but to limit one's view to just rayons would be fallacious. Rayons as we know them now will probably be extinct within the next ten years. Just what will replace them probably no one can say except that they will be replaced by other synthetics starting with the strong rayons and the various chemical yarns of which Nylon at present is the most outstanding example.

The first thing that is necessary to think clearly in regard to synthetics is to divorce your mind completely of the thought that synthetics are a substitute for any other natural fibers. Probably one of the most unfortunate things that happened to rayon was for it to be called at the start "artificial silk." To think of synthetics as substitutes limits them to a degree that is as unfair as it is unwanted.

To take the point of view that synthetics are going to replace completely the natural fibers is also fallacious but what natural fiber contains the possibilities that can be seen in synthetics? That statement can be made still broader: do all of the natural fibers together contain the possibilities that are at present visible in the synthetics?

To illustrate, most people think of Nylon as one yarn, however this is only true because of the constrictions of war. Nylon rather should be thought of a general name for a whole new group of yarns such as the general term rayon includes no less than three commercially important types. Synthetic yarns can be manufactured to anyone's specifications and are commercially produced with a rubber-like elasticity of 150 to 300 percent. Synthetic yarn can be spun with a higher strength than is possible with any natural yarn. They are made with any size filament from that finer than the finest of natural fibers to any thickness desired. Filaments can be spun either with a continuous hole through the center of them or with little bubbles protruding from the filaments each individually sealed. Synthetics can be manufactured with permanent crimp, with smooth or uneven surfaces. They normally are extruded strictly uniform as to size but can also be varied in whatever proportions desired. Synthetics can be spun that absolutely refuse to burn or that explode like gun powder, that refuse to absorb any moisture whatever or are more absorbent than soft linen. The possibilities of synthetics are limited only by the imagination of man.

In so broad a field as synthetics naturally specification is absolutely necessary. Here a new person entering the field is in an especially advantageous position for he is able in a good many cases to start right at scratch and in all cases should be able with only a reasonable amount of study and application to master the known knowledge in his field and start contributing to it. What other textile offers this to the degree found in synthetics?

It must be born in mind that in general synthetics will build upon the past experience of natural fibers. In one respect this is unfortunate since these synthetics can be so different, however there is no question that eventually machines, materials, and methods especially for synthetics will be evolved and they are going to be evolved, for the largest part, by persons who are not in that field today.

A little editorializing should not be out of place here. Be honest with yourself. Don't go into something in which you are not genuinely interested, whatever, you might bear in mind that as your knowledge of a subject grows so does your interest. I heard a noted psychologist say that you know you have found your chosen work when you can do it without apparent fatigue. Of course, he was speaking relatively but it is a good rule to apply.

Everyone starting out on a career is confused at first. The reason is simple. You cannot make palms or decisions unless you first have a knowledge of the elements that are necessary. While this knowledge is being gathered and plans are being formulated (oft times subconsciously), there is one ideal

(continued on page fifteen)
Professor Dunlap Does Card Speed Research Work

By John J. McCarthy, '43

It is with a great deal of pride that we print this account of Professor Dunlap's research work in card speeds. We are sure that he is well known to all Clemson men studying in the Textile School at the present time, and to many of those who have gone out into the industry before us. Mr. Dunlap is Professor of Carding and Spinning, and he also teaches courses in Textile Mathematics at Clemson. He has been on leave of absence for the past year doing work of a very important nature in several textile mills throughout the Southern States.

When the present national emergency arose a demand for maximum output was placed on all manufacturers in various industries. Every factory and mill in the Nation was asked to speed up production to rates far above their normal pace-time standards and to do it as quickly as possible. Cotton textiles are definitely playing a vital part in the war effort, and it was up to all cotton manufacturers to find ways of speeding up their production, and at the same time maintain the highest possible quality in their products. Quality fabrics are an asset to any manufacturer, and, what is more imperative at present, Army and Navy specifications must be met before the cloth can be accepted.

One of the possibilities suggested for increasing production was speeding up the cards. At first this idea did not meet with general approval, but it was finally decided to give it a try. Cards had been operating efficiently for years at the conventional and commonly accepted maximum speed of 165 r.p.m. Could we not increase this speed somewhat and still maintain the present efficiency? Would the quality of the yarns produced suffer because of these increased speeds? Endeavoring to answer these questions, arrangements were made to conduct tests in fifteen mills located in various sections of the South; the mills ranging in size from comparatively small ones to very large ones. It is logical to assume that fifteen mills, each in a different locality, varying in size, and each with its own equipment and manufacturing set-up would be able to provide information upon which authentic reports and from which definite conclusions could be drawn.

The research problem is under the sponsorship of The Textile Foundation, The Southern Textile Association, and The Arkwrights. Each of the mill tests are under the supervision of Mr. Dunlap, but are carried out by the personnel of the particular mill. The general aim of the project is to improve plant operations in the textile industry; this card speed problem being one of the phases of the general effort. After directing the procedure of each if the tests, Mr. Dunlap collects the data and correlates the results of the various mills. The experimental yarns and fabrics produced by the mills are taken to the laboratory and tested in order to determine the results of the mill tests. In all of the mills the increased card speeds were obtained by changing the size of the driving pulleys, which in turn caused a corresponding increase in speed of the various other moving parts of the card. The same settings at the card were maintained over the whole test period. The lap weights, silver sizes, and waste data were provided by the mills, and the tests made on the resulting products were made by Professor Dunlap in the testing laboratory of the Clemson College Textile School. The yarns were graded against the appearance standards developed by the U. S. Department of Agricultural Marketing Administration, and which have been adopted by the American Society of Testing Materials.

Several factors determine whether or not it would be advisable to increase the speed of the card cylinder. In the opinion of the manufacturers themselves the following items should be taken into consideration: (a) condition of the cylinder bearings, (b) condition of the card clothing, and (c) the amount of vibration in the floor. Increased speed means additional wear on the bearing surfaces, added strain on the various parts, and more centrifugal force acting on the card clothing. The question was: could the machine stand the added strain? In one instance Mr. Dunlap was asked to run the experiment by one mill, but he refused to do so after inspecting the card clothing because it was in such bad condition. The results of these tests were amazing, in that the gains made were surprisingly above expectations. To give you some idea of the results obtained, here is some of the data from one of the mills. On the card running at 165 r.p.m., 9.92 pounds per hour were carded. Total waste on the card was 5.350 per cent. On the card running at 192 r.p.m., 11.84 pounds per hour were carded. Total waste on this card was 5.137 per cent. As one can see, here is an increase of over 19 per cent in pounds carded per hour. By observation we note, too, that the waste was cut down nearly 4 per cent (bases on the original waste of 5.350 per cent). One mill reported to Mr. Dunlap that as a result of increasing the

(continued on page fifteen)
Table 1.—Classification of Cotton and Other Mechanical Information

<table>
<thead>
<tr>
<th>Mill</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.P.M. of the cylinder</td>
<td>165 R.P.M.</td>
<td>192 R.P.M.</td>
</tr>
<tr>
<td>Staple of cotton</td>
<td>1-1/16”</td>
<td>1-1/16”</td>
</tr>
<tr>
<td>Grade of cotton</td>
<td>Western Mid.</td>
<td>Western Mid.</td>
</tr>
<tr>
<td>Pickers: Rear beater</td>
<td>Buckley</td>
<td>Buckley</td>
</tr>
<tr>
<td>Middle beater</td>
<td>2-blade</td>
<td>2-blade</td>
</tr>
<tr>
<td>Front beater</td>
<td>Kirschner</td>
<td>Kirschner</td>
</tr>
<tr>
<td>Cards: Relative humidity</td>
<td>57%</td>
<td>57%</td>
</tr>
<tr>
<td>Stripping schedule</td>
<td>3 per 8 hr.</td>
<td>3 per 8 hr.</td>
</tr>
<tr>
<td>Ounce lap fed</td>
<td>13.50</td>
<td>13.50</td>
</tr>
<tr>
<td>Grain silver delivered</td>
<td>49.88</td>
<td>50.71</td>
</tr>
<tr>
<td>Pounds carded per hour</td>
<td>9.92</td>
<td>11.84</td>
</tr>
<tr>
<td>Model (year)</td>
<td>1928</td>
<td>1928</td>
</tr>
<tr>
<td>Age of clothing</td>
<td>7 yrs.</td>
<td>7 yrs.</td>
</tr>
<tr>
<td>R.P.M. of doffer</td>
<td>196</td>
<td>196</td>
</tr>
<tr>
<td>R.P.M. of licker-in</td>
<td>407</td>
<td>475</td>
</tr>
<tr>
<td>Front plate settings: Top</td>
<td>.023</td>
<td>.023</td>
</tr>
<tr>
<td>Bottom</td>
<td>.023</td>
<td>.023</td>
</tr>
<tr>
<td>Drawing: Type</td>
<td>regular</td>
<td>regular</td>
</tr>
<tr>
<td>Processes: 2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>R.P.M. of front roll: Breaker</td>
<td>319</td>
<td>319</td>
</tr>
<tr>
<td>Finisher</td>
<td>309</td>
<td>309</td>
</tr>
<tr>
<td>Top rolls: Cork</td>
<td>319</td>
<td>319</td>
</tr>
<tr>
<td>Cork</td>
<td>309</td>
<td>309</td>
</tr>
<tr>
<td>Roving: Processes: Super draft and H. R</td>
<td>3.00 H.R.</td>
<td>3.00 H.R.</td>
</tr>
<tr>
<td>Slubber H. R.</td>
<td>3.00 H.R.</td>
<td>.80 H.R.</td>
</tr>
<tr>
<td>Intermediate H. R</td>
<td>3.00 H.R.</td>
<td>.80 H.R.</td>
</tr>
<tr>
<td>Spinning: Type</td>
<td>long draft</td>
<td>long draft</td>
</tr>
<tr>
<td>Top rolls: Cork</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Cork</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Yarn count</td>
<td>31s</td>
<td>31s</td>
</tr>
<tr>
<td>R.P.M. of spindle</td>
<td>9,900</td>
<td>9,900</td>
</tr>
<tr>
<td>R.P.M. of front roll</td>
<td>122</td>
<td>122</td>
</tr>
<tr>
<td>Ring diameter (inches)</td>
<td>1.875</td>
<td>1.875</td>
</tr>
</tbody>
</table>

Table 2.—Test Results

<table>
<thead>
<tr>
<th>Card waste: Motes and fly</th>
<th>Per Cent</th>
<th>Per Cent</th>
<th>Per Cent</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyl. and doffer strips</td>
<td>1.056</td>
<td>1.103</td>
<td>1.567</td>
<td>1.580</td>
</tr>
<tr>
<td>Flat strips</td>
<td>.905</td>
<td>.710</td>
<td>.888</td>
<td>.684</td>
</tr>
<tr>
<td>Total waste</td>
<td>3.389</td>
<td>3.324</td>
<td>2.507</td>
<td>2.107</td>
</tr>
<tr>
<td>Silver variation</td>
<td>Per Cent</td>
<td>Per Cent</td>
<td>Per Cent</td>
<td>Per Cent</td>
</tr>
<tr>
<td>Avg. max. variation per yd</td>
<td>10.83</td>
<td>9.88</td>
<td>11.66</td>
<td>10.88</td>
</tr>
<tr>
<td>Max. variation in 20 yrs</td>
<td>20.00</td>
<td>21.11</td>
<td>25.55</td>
<td>25.55</td>
</tr>
<tr>
<td>Yarn size (average of 100)</td>
<td>Count</td>
<td>Count</td>
<td>Count</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>30.86</td>
<td>31.14</td>
<td>31.13</td>
<td>29.56</td>
</tr>
<tr>
<td>Strength: Skein (corrected)</td>
<td>Pounds</td>
<td>Pounds</td>
<td>Pounds</td>
<td>Pounds</td>
</tr>
<tr>
<td>Skein (actual)</td>
<td>54.50</td>
<td>59.29</td>
<td>61.55</td>
<td>64.14</td>
</tr>
<tr>
<td>Single strand</td>
<td>54.77</td>
<td>59.02</td>
<td>59.32</td>
<td>65.10</td>
</tr>
<tr>
<td>Stretch: In single strand</td>
<td>Per Cent</td>
<td>Per Cent</td>
<td>Per Cent</td>
<td>Per Cent</td>
</tr>
<tr>
<td></td>
<td>7.62</td>
<td>7.52</td>
<td>7.79</td>
<td>7.49</td>
</tr>
<tr>
<td>Yarn appearance: Compared with standards</td>
<td>Grade B-</td>
<td>Grade B+</td>
<td>Grade C+</td>
<td>Grade B+</td>
</tr>
</tbody>
</table>

*Editor's Note: In both of these tests the breaking strength of the yarn increased when the speed of the card was increased*
Textiles in the War Effort
By L. H. Hance, '44

As the world stands today on the precipice of opportunity and gazes down into the valley of the future with the forces of the past pushing it from behind, it sees that it must think quickly in order to be able to react intelligently to the modern situation, lest it fall in failure in the unpredictable tomorrow. The industries of today are seeking to produce all they possible can to meet the government's needs in and "all out war." In the present limelight where is cotton? Where does the textile industry fit into the picture? Does today seem to bring shadows for tomorrow?

One has only to travel over the piedmont district of South Carolina and North Carolina to see immediately how quickly and earnestly America is responding in the textile field. During the past few months millions of yards of cloth have been ordered by the government, and these mills are rapidly adopting their own situation in order to produce as much cloth as the government needs and as quickly as the government demands it. Mills which heretofore produced only sheeting have made quick change overs to twills and denim.

One of the biggest problems in change overs has been the difficulty of producing quality and yet getting a maximum production. An adaptable mill has probably found it possible to take orders and start production flowing without hesitation because it has been accustomed to doing so in the past. There are, however, hundreds of mills which have been caught in their old-fashioned setups which have necessarily required that they change their entire routines. Some mills feel that they face disaster, but rather than fall in ruin, they have bought what new machinery they could obtain and have gone "all out" for production. Each day brings some problem which the mill has not heretofore solved and must solve in order to exist. Some pessimists have dared to ask, "What will become of all these turnovers when the war is finished?" Will they bring failure? We say, "Definitely no!" These new problems which the mills solve in maintaining an increased production are presenting new ideas and angles for larger scale production which can easily be figured out for smaller scale.

The mills which have undertaken parachute fabrics, oil silk, and such materials are finding new and better substitutes for fibers which means increased economy besides longer durability in the future.

This production that the mills are endeavoring to speed up has presented a big problem in the upkeep of the mills. Since the government has taken over the steel and rubber industries, the mills are finding it hard to exist without new parts for their machinery. They are, however, learning to economize and to make the parts they need right in their own shops. This will definitely play a part in the future of the mill because after the war there will be less dependency on machine manufacturers and more economy in the mill itself.

Another problem that presents itself to the textile industry in war time is that of obtaining cotton for the manufacturing. Since the army has taken many of the farm laborers, the mills will find it difficult to get cotton from the farmers. This problem has sent the chemists searching for some synthetic fiber that can be produced cheaply and yet economically. The results of these searches will undoubtedly bring new and better materials for the future.

As far as we have been able to ascertain, the future for Textiles is much brighter than the average person thinks. The machinery and methods of manufacturing of tomorrow will be on a larger scale and on a more economical basis.

Textiles are playing a part in the war that cannot be overemphasized. Textiles must be speeded up for VICTORY.

—The Bobbin and Beaker—

Aralac Advances Rapidly

Aralac is a fiber which is obtained from casein, the protein constituent of milk. Chemically it is quite similar to wool, mohair, and fur; it looks and feels much like wool, having much the same texture and appearance. It is really a resin made from a protein base. Although Aralac is now in mass production and has been for some time, it has not as yet reached a stabilized chemical state, because the most desirable process which would give a fiber possessing the strength of silk and the softness of wool. The reason is that there are several different processes and varied chemical compositions possible. At the present time the producers of Aralac have selected the processes which give it the most outstanding properties required by the textile industry.

The source of the protein is cow's milk, the product resulting from a desire to find additional uses for dairy products. The milk is first put through a separator to take the fat, as cream, from the milk. Then it is treated with an acid which coagulates the milk and conglobates the protein leaving a substance called whey. The protein is separated from the whey and sent to the plant where the fiber is produced.

(continued on page eight)
A Parting Word to Clemson Cadets
By Major F. B. Farr

History has been a continuous record of man’s struggle for liberty. Even in the early stone age there was found in the uncivilized mind of the savage a desire for freedom. This desire, like the little star of Bethlehem, has blazed the pathway along which the civilization of man has advanced. Where this God-given right of mankind has been denied, the wheels of progress have ceased their turning and proud walls of mighty empires have been leveled with the dust.

Freedom! Born beneath the sunny skies of ancient Greece before the Man of Galilee enunciated the supreme law, “Thou shalt love thy neighbor as thyself.” Freedom! Cradled in the England of the middle ages by those bold barons, who at Runnymede, wrested the Magna Charta from a reluctant king. Freedom! Fostered in colonial America by a noble band of patriots who struck asunder the shackles of British despotism. And Freedom, forever established by fifty-five immortal Americans, who in 1787, in order to secure the blessings of liberty for themselves and for their posterity, did ordain and establish the Constitution of our United States. With the exception of that God-breathed revelation called The Bible, our Constitution is the world’s greatest guide to an everlasting freedom.

Today America is totally involved in war against the Axis powers. Total warfare means more than weapons and machines, and more than the mobilization of the material resources of our great nation. It means the full employment of our human resources as well. It calls for vision and foresight in organizing the economic life of the nation to its maximum capacity while preserving and strengthening our democratic system. Defense of freedom and democracy calls for wise planning and the formulation of policies which look beyond the war. And our greatest resource of democracy in peace and in war is a vast body of free and determined citizens.

The conquerors of this civilization and the conquerers of all time will be those men and women who are not afraid to bend their knees and open their hearts to an eternal God.

Clemson men, the time has come when we must think and act not as individuals or as separate states, but as a nation. Firm, constructive hopeful, Christian leadership is what the world now needs. We must stand ready to fight and die if necessary to uphold the ideals upon which our nation was founded. This is the only way by which German aggression and Japanese imperialism can be destroyed.

Surely, Tigers, we will remain true to the memory of those embattled farmers who unfurled their flag on Concord bridge, to those immortal Americans who laid the foundation for the most powerful and successful government on the face of this earth, and to those who for the Stars and Stripes are today giving their lives across the seas. And with the spirit of our Constitution in our hearts may we breathe its freedom, live its principles, pledge our lives to its support, and pass on to the American of tomorrow a land of law, of liberty, and of peace.

And in passing on this priceless heritage, let us hope that a world-wide assembly may someday be forced to bear into its legislative halls our same Constitution, and that our children, still dwelling beneath the proudest flag that floats on land or sea, may with Tennyson welcome that glorious day “When war drums throb no longer and battle flags are furled in the parliaments of man the federation of the world,” and say with Markham, “Let mercy speed the hour when swords shall cease and men cry back to God, there shall be peace.”

—Bobbin and Beaker—

ARALAC ADVANCES RAPIDLY
(continued from page seven)
Here the dry protein is mixed into a thick, viscous syrup, forced through spinnerettes, and then coagulated into a filament. After the filament is formed it is chemically treated in order to fix its dying qualities, and to give the fiber other desirable characteristics. After these reactions are complete the resulting product is a resin fiber which has the drying qualities and characteristics of animal fibers.

Aralac has made a very successful debut in textiles, and it is destined to become just as important and extensive in the industry with regard to wool-like textiles as rayon has become as a competitor of silk.

It has developed much more rapidly than the time taken to put the cellulose fiber where it is today. By the same token, Aralac must be quicker to adjust itself to the needs of the textile industry; and this it seems to have accomplished at this comparatively early stage. It has been blended with cotton, wool, rayon, mohair, and other combinations of these fibers, to produce excellent style fabrics; it has been used up to as much as fifty percent in blending. It may be cut into any fiber length up to six inches. Recently it has been used in making blended yarns for knitting.

—The Bobbin and Beaker—

Lt. Gordon E. Williams, Jr., Quartermaster Corp. U. S. Army, was a recent visitor on the campus. Lt. Williams, editor of THE BOBBIN AND BEAKER in 1941-42 is now with the 69th Quartermaster Battalion, Camp Clairborne, La.
Mill Power Supply

By John J. McCarthy, '43

In the management of a textile mill the cost of power is one of the most significant items of expense. Without the correct amount of power production would be seriously hampered, as one can see. Therefore it behooves the mill executive, and the future executive, to know something about the cost of power and its economical use. With this point in mind we give you here a short discussion on the intelligent analysis and application of electrical machinery, since this type of machinery is the chief means of distributing power in the mill. We have heard students ask why it is necessary for them to study the subjects of electricity and other related engineering topics; here is the answer. One can not understand the operation and application of electrical machinery unless he is familiar with the fundamentals of electric motors and the peculiar characteristics of an electric current.

When selecting a motor to drive some piece of machinery it is necessary to analyze the situation thoroughly before buying the motor. The length of time the motor is to run each day without stopping, the average power demands made on the motor, and the peak power demands, must be determined before the motor is selected. For example, instances have been cited in selecting a motor for a loom, where the user judged the quality of the motor by the number of picks obtained in comparison with another motor operating on the same type of loom with the same size gears. If the new motor gave less picks it was judged inferior, and if it gave more picks for the same length of time it was judged superior. Experiments have shown that in many cases the loom giving fewer picks was still the better motor in over-all performance; the difference in the number of picks being made up by changing the gear ratio to conform with the speed of the motor.

In other cases the loom motor was selected on the basis of the average power demands of the loom. It has been shown by analytical tests that the average power demand is not an accurate measure to use when purchasing a loom motor, but that the peak power requirements and the periodic pulsating surges of power in a loom, which are now being considered in loom motor design, must also be considered if the most economical and efficient performance is to be obtained.

Choice of Size of Apparatus

Obviously, it is unwise economically to use a 25 hp motor to drive a machine requiring only 10 hp. Not only the capital investment would be high, but at such a small fraction of full load the full-load efficiency of the motor would be poor. In the case of an induction motor the power factor at small fractional loads would be low. By experiment and graphical studies it has been shown that motors of fractional horse-power have a very high purchase price per horse-power, and that motors of higher power rating have much lower purchase prices per horse-power. It seems to be so much the amount of material going into the motor as it is the cost of labor in building the smaller motor which causes the difference in price. For example, in a polyphase induction motor of normal torque the cost of 10 hp in 1 hp motors is $39.00 x 10—$390.00, while the cost of the same hp in one 10 hp motor is only $120.00.

Group Drive vs. Individual Drive

This matter of several small motors or one large one brings up the question of group drive vs. individual drive. There seems to be no hard and fast rules governing one method or the other for every application. Each situation has its own factors, and rarely are they applicable to another instance. In each case the advantages and disadvantages must be considered. As a general rule a saving can be made by using a group drive in the following cases:

1. Where there are compact groups of constant-speed machines which are to be run continuously and simultaneously.

2. In cases in which compact groups of machines which, because of their diversity of load may be driven by a single motor of much smaller rating than the combined capacities of the motors required for individual drives.

3. Where groups of constant-speed machines with heavy peak load demands might require individual motors of a size much in excess of the average running load.

4. Where motors required for individual drive are small.

5. If in changing over an existing installation the old system of line-shafting may be used as already installed.

Under some conditions, however, the initial cost will be less with individual drives when:

1. The machines are isolated and the line shafting is impracticable.

2. The roof construction will not safely support line shafting and the floor structure does not permit hanging the line shafting beneath it.

3. The speed of the machine must be independently variable.

4. It is necessary to move the machines from one location to another frequently.

In addition to the above mentioned considerations it should be remembered that with a group drive there will be many open belts from ceiling to floor which present some hazard to operatives. The ap-

(continued on page eighteen)
Rayon vs. Cotton in Tire Cord

By T. Arnold Turner, Jr., '44

America's army is rolling to war on rubber and rayon. Rubber has commanded the public's attention, because of the acute nationwide shortage. A newly developed type of rayon has been conserving many precious tons of rubber.

Tough fibers of this new rayon lie beneath the outer layer of rubber skin of military and civilian tires. Possessing greater strength than any other fine fabric and keeping its great strength under the high heat of heavy duty driving, this rayon fiber permits tires to have thinner but stronger walls, adds thousands of miles to their life, and reduces the amount of rubber going into the tire.

This high strength yarn, developed by E. I. du Pont de Nemours and Company, must take an unbelievable amount of punishment. By the way, the new trade name for this high tenacity fiber is called "Cordura." The large tires of the heavy bombers are required to stand up under the jolt of tons of metal landing at high speed, without a blowout. The combat car, called the "jeep," is driven over the roughest terrain, but the Army demands as well that the combat car tire have sufficient structural strength so that if punctured it can run flat for many miles until its mission is complete.

Ordinary rayon is usually made from the cellulose of purified wood pulp. "Cordura" high tenacity rayon is made from the cellulose of cotton linters which are the short fibers remaining on the seed after cotton is ginned. However the different raw materials used are not as important as are the steps in the process of making this unusual yarn. The increased strength is mainly due to stretching the filament immediately after it is formed. The final product, made under careful chemical and physical control, and the correct amount of stretching, is a filament having a tensile strength of 70,000 pounds per square inch. For its size, the rayon cord tire has a skeleton as strong as the skeleton of a skyscraper.

The chief advantage of this new rayon is that heat does not sap its strength as in cotton cords. Consequently, it can be used more sparingly in building a tire. Rayon cord tires run on an average of 15 percent cooler than other tires. Because the rayon cord tire lasts longer, it has a great economical value in that it can take a thicker tread and can also be re-treated more times.

The lighter weight tire made possible by rayon cords is of particular importance in aviation where the tire is needed only for taking off and landing and is simply extra weight during the flight. Obviously, the saving of tire weight, to give more sky mileage or to make room for more guns and bombs, is of tremendous importance in military planes.

Of course, whenever there is a new idea, invention, or patent, there is always an industry or manufacturer who opposes its development in defense of older methods which have been in use for many years. This new high-tenacity rayon is now in this stage of development. The cotton manufacturers are now engaged in a heated argument with Walter M. Jeffers, the newly appointed rubber czar in the United States.

The National Cotton Council has charged that the proposed expansion of the rayon cord tire program threatens "serious injury and injustice" to cotton's largest market. They contend that the rayon expansion program is being launched while tests of cotton vs. rayon cords still are under way, and in the face of preliminary evidence that such a program is neither necessary nor justified by the war effort.

President Iscar Johnston of the National Cotton Council points out that the War Production Board has already put into effect a program which would quadruple the output of rayon.

"This matter of rayon tire cord expansion was first agitated solely on the basis that rayon cord, being then in use, would save rubber," Mr. Johnston said. "The cotton mills, in cooperation with some of the rubber companies, promptly produced a thinner cotton cord which was proved by tests to save equally as much, and in some instances more rubber than could be saved with the rayon cord.

"Then the question of satisfactory performance of the thinner cotton cord was raised. Army tests were made by the Motor Transport Corps, and this question of performance had to be abandoned just as the rubber-saving argument was abandoned."

"The last question raised was that synthetic rubber generates more heat than natural rubber and that rayon might be necessary on this ground. Preliminary tests have indicated that this contention is a fallacy, yet the requirements committee proposes to rush ahead without waiting for the final results."

Tire cord constitutes a market for cotton which is larger by nearly 50 percent than any other.

And then, too, the abundant raw materials and manufacturing facilities are available to provide cotton cord immediately. The rayon expansion program would require approximately nine months of time, thousands of tons of steel and hundreds of thousands of manhours before it could become operative.

The use of rayon instead of cotton in the manufacture of tires will probably force the smaller tire manufacturing companies out of business. The patents on the rayon process are owned by the U. S. Rubber Company and the Goodyear Tire and Rubber Company, two of the "big four" vested interests.

(continued on page fourteen)
Textile Faculty Members Called Into the Service

Additional burden placed on professors, but problem being solved.

THE TEXTILE SCHOOL FACULTY

On returning to Clemson this year, the textile students were faced with seriousness of the problem of a reduced faculty due to the present conditions of a world at war. During the summer, two of the members of the textile school faculty were called into active duty in the United States Army. Their positions as yet have not been filled by new men but are being temporary filled by the remaining members of the faculty and two seniors in the school of Textile Chemistry.

Lieutenant M. L. Huckabee, formerly a professor of Textile Chemistry at Clemson, was called into active service in June and is now with the Chemical Warfare Service, Grant Building, Atlanta, Georgia. Lt. Huckabee graduated from Clemson with a B. S. degree in Textile Chemistry in June, 1933. Since that time he served as a member of the faculty of the Textile Chemistry Department until being called into the Army.

Lieutenant W. E. Tarrant was the second member of our faculty to be called into active service during the summer. While at Clemson, Lt. Tarrant was assistant professor of Weaving and Designing. He is now stationed at the Officer's Training School, Naval Air Station, Miami, Florida.

The loss of these two men at a time when no one can be found to replace them has worked a hardship on the remaining members of the faculty of the textile school. They have been forced to add extra classes to their already strenuous schedules in order to give the students a complete course in textiles.

In the Textile Chemistry department which now has a faculty of only two professors, two senior textile chemistry students are employed as laboratory assistants. Their duties are to assist the professors in the teaching of laboratory work. This is done so that the professors may have more time to assume the duties of Lt. Huckabee. In the department of Weaving and Designing, the duties of Lt. (continued on page fifteen)
The Editor's Page

AGAIN, WE SAY, "THANK YOU!"

The Bobbin and Beaker was organized in November, 1939, by members of Iota Chapter of Phi Psi, national honorary textile fraternity at Clemson. The first issue of the magazine was published in March, 1940. A copy of the magazine was given to each textile student at Clemson, and a copy was mailed free-of-charge to every textile plant in South Carolina, North Carolina, and Georgia. Recently, many mills of Alabama have been added to our mailing list.

Two years ago, Dean Willis gave the staff of The Bobbin and Beaker a room just across the hall from the Phi Psi room in the textile building.

Again, we wish to say that we appreciate the cooperation of Dean H. H. Willis of the Clemson Textile School, and of the Clemson College Business Manager and his staff who have rendered practical advice and aid. We appreciate the article by Mr. John T. Wigington and also for his very sincere interest in our work. We are grateful to Mr. C. W. Bendigo, for his contribution to the magazine. We thank the students for the articles they have written and also those students who have always been willing to render any assistance possible.

Last, but by far not least, we thank those advertisers who make the publication of the magazine possible by advertising through The Bobbin and Beaker, and we sincerely hope that our services will prove as valuable to you as yours have to us.

—M. D. M.

REORGANIZATION OF COURSES EFFECTED

Last summer the Clemson College Textile faculty undertook the reorganization of textile courses at Clemson and the preparation of textile teaching material especially adapted to the ever-changing conditions of the industry. The work was carried on in cooperation with the Textile Foundation and deals largely with weaving subjects alone. Since no students are majoring in Weaving and Designing, there is room in advanced subjects of Weaving and Designing for those students who desire these advanced subjects.

—The Bobbin and Beaker—

INTERMISSION PARTY A SUCCESS

The Phi Psi Autumn Ball intermission party, held last Saturday night was a most enjoyable party. Some of the old grads, who were here for Homecoming, were present and seeing them again was a real pleasure. Among the guests was Ray Herbeck, whose popular orchestra played for the Autumn Ball week-end series.

A CHALLENGE TO FRESHMEN

Ever since your enrollment at Clemson in the class of '46, you all have been urged to study and to work hard, and to do your best to successfully complete your college education. You have been told that these are hard times, uneasy times, and also that only the strugglers and the workers will find themselves among the group who are most likely to succeed. We, as the Textile students who have gone through a little more than you all have, urge you to listen to this advice, and to do your best to make these four years at Clemson mean something to you, your parents and your friends.

Being members of the Textile school, you all have a fine opportunity to become members of a number of honor fraternities. These fraternities are within everyone’s reach and they should be the goal for which you are setting yourself. College means much more than getting a degree after four years; it means and represents four years of association with the boys who will be your friends, pals and companions throughout your life. These fraternities offer you the chance to make lasting friendships of the highest caliber.

The first fraternity which has its doors open to you is Phi Eta Sigma. It taps new members at the end of the first semester of the freshman year, and at the beginning of the sophomore year. A grade point ratio of 7.5 is the requisite. Rather high, isn’t it? But others have done it. Why can’t you?

Phi Psi, the national honor textile fraternity, is next on the list, and this organization should interest you all more than any other. It is your fraternity; the fraternity of the Textile students. Members are tapped at the beginning of the junior and senior year, and some are taken at the end of the junior year. The highest sophomore is taken in at the end of his second year, only one from the entire school. Grades, character and activities are requisites for Phi Psi.

At the beginning of your senior year, you may be asked to join the Phi Kappa Phi, honor scholastic fraternity with chapters all over the nation. A grade point ratio of 6.5 is the only requirement.

These are only three fraternities of which you may become members, but don’t forget Blue Key, Tiger Brotherhood, Scabbard and Blade. Who’s Who and scores of others which are only too happy to increased their enrollment. No one has ever regretted his action by joining these organizations, and none ever will.

They are all “top” fraternities and need “top” men if they are to carry on their work. Why not be one of those who can be called the “top” man.

—B. A. C.
PHI PSI
Assumes Prominence on the Campus

THE HISTORY OF PHI PSI
By B. A. Chestochowski, '43

The Phi Psi Fraternity was founded by five students of the Philadelphia College of Textile Engineering on March 18, 1903 for the purpose of promoting good fellowship, social intercourse, mutual advancement of its members and the art of textile manufacturing. In 1905 the Fraternity was incorporated under the laws of Pennsylvania. Beta Chapter was organized in 1904 at the New Bedford Textile School, New Bedford, Massachusetts, and the same year Gamma Chapter at the Lowell Textile School, Lowell, Massachusetts was admitted into the fold. Delta Chapter was organized at the Bradford-Durfee Textile School at Fall River, Massachusetts in 1909.

In May, 1942, Eta Chapter was formed at the North Carolina State College, Raleigh, North Carolina, and on January 10th of the following year, 1925, Theta Chapter was organized at the Georgia Institute of Technology, Atlanta, Georgia. In May, 1927, the Iota Chapter of Clemson College was given a Charter.

Phi Psi Fraternity is the largest and most respected textile Fraternity in the world, and its alumni hold some of the highest positions of trust and respect in all branches of the industry.

The Iota Chapter of Clemson College basits membership upon scholarship and activities, taking into its fold only the top ranking men of the Textile School. The Textile Chemists, Textile Engineers, Weaving and Designing students as well as the Textile Industrial Education men are all eligible for membership.

During the World War I the Fraternity service flag contained one hundred and sixty-four stars: seven of which were turned to gold. World War II has more than doubled that number to date, and reports state that some gold stars have also been added. The Iota Chapter has added perhaps more than any other Chapter to this number of men in the services, because of its military organization.


The initiation of the new members consisted in the usual carrying of the shuttle and dyed skeins, and the initiates were required to reorganize the old members with a shuttle salute. The anti-rough procedure was climaxed by a written exam which was required of each initiate. The exam covered the By-Laws, Constitution and Rituals of the Fraternity.

The final degree will be held in the near future at which time the newcomers will receive their Fraternity pins and shingles, thus signifying their acceptance into the national organization. A formal installation will take place at a banquet following the final degree.

New members will be chosen at the early part of the next semester, and these will consist of the top ranking sophomore of the Textile School along with a number of the top Juniors.

At the latter part of the past semester the new officers of the Iota Chapter were elected consisting of Charles R. Howard, President; Thomas E. Crosson, Vice President; Lang S. Ligon, Senior Warden; Morris D. Moore, Junior Warden; and Laconia H. Hance, Secretary and Treasurer. They assumed their respective offices following the Banquet at which they were chosen.

Charles R. Howard, textile chemist from Augusta, Georgia, succeeded Jim Barton, textile engineer from Anderson, S. C., who is at present with the Quartermaster Corps of the U. S. Army.

-By B. A. Chestochowski, '43

PHI PSI SERVICE FLAG

One of the first projects to be undertaken by the Fraternity at the beginning of this semester was the making of a Fraternity Service Flag. The flag will be made entirely by the student members of the chapter including the dyeing and cutting of the field, borders and the stars.

All the chapter members who are now in the armed services of the country will be represented by a blue star, and in the event of death a gold star will be substituted. To date no actual number has been obtained as yet, but a survey is well under way to determine the total number of stars which will decorate the flag.

The flag upon completion will be draped on the South wall of the Phi Psi Fraternity room in the New Textile Building, where it will remain for the duration.
Textile Graduates Serve in the Army

Note: (The addresses of the men listed below are at present unavailable. Anyone knowing the address of any of the following men will be doing us a favor by informing us as to their whereabouts.)

Lt. Wallace Milton Ackerman
Lt. Hunter Septimus Ackis
Pvt. William Augustus Barnette
Lt. James Harleston Barton
Lt. William Hester Woods Baker
Lt. Jack Kuykendall Benfield
Lt. Robert Saye Berry
Lt. Thompson Stokes Boland
Lt. Jones Edward Bolt
Lt. Ray Charles Boswell
Lt. Henry Bradford, Jr.
Lt. Henry Leroy Buchanan
Lt. Wade Hampton Carder
Lt. Thomas Clayton Cargill
Lt. Thomas Clayton Cargill
Lt. William Hunter Carson
Lt. Fountain Gray Cash, Jr.
Lt. Joseph Lewis Cox
Lt. John Augustus DesPortes
Lt. Robert Francis Drennan
Lt. Edward Ervin DuBose, Jr.
Lt. Grady Milford Dunlap
Lt. Beoron Aurrell Fletcher
Lt. Francis Nicholas Fortunato
Ensign Fred M. Fox
Lt. William Copeland Gilmore
Lt. James Hughes Godfrey, Jr.
Lt. Nelson Vereen Gore
Lt. Frank Johnson Haddon
Lt. Jack Edward Hamilton
Lt. Grover Cleavand Henry
Lt. Robert Allen Hickerson
Lt. Donald Neal Hill
Lt. Charles Welcome Hite
Lt. John Wesley Howard
Lt. Julius Clifford Hubbard
Lt. Nelson Jackson, III
Lt. Lake Hugh Jameson
Lt. Ralph Cameron Johnson
Lt. Albert Eugene Johnston
Ensign John Dargan Jones
Lt. Charles William Kay
Lt. John Granberry Kelly
Lt. George Walker Kirby
Lt. Thomas Simpson Kligh
Lt. Evans Allen LaRoche
Lt. Wattle Smith Ligon
Lt. James Burton Lindsay
Lt. William Henry Lowe
Lt. Paul William McAlister
Lt. William Thomas McCoy
Lt. Norwood Reaves McElveen
Lt. James Fleming McMaster
Lt. Joe Fred McMillan
Lt. Henry Smith McNair
Lt. Anderson Chase Nalley
Lt. Richard Thacker Osteen
Lt. William Robert O'Shields
Lt. Benson Clayton Parrish
Lt. Thomas Eugene Peterson
Lt. Clarence James Pope
Lt. McKinney Hurt Ramsey
Lt. DeWitt Javan Ross
Lt. Woodrow Feron Sanders
Lt. William King Shirley
Lt. Mitchell Forrest Simmons
Lt. Heyward Vance Simpson
Lt. Richard Newman Steele
Lt. Harry Lyle Sturgis
Lt. John Willis Sullivan
Lt. Arthur Ehrich Thomas
Lt. John Lester Thompson
Ensign Charles Allen Turner
Lt. George Sims Wham, Jr.
Lt. Gordon Edmund Williams

—The Bobbin and Beaker—

RAYON VS. COTTON IN TIRE CORD

(continued from page ten)

Elliot F. Simpson, former counsel to the House sub-committee on rubber, says that as early as last June he had been informed that "the big four were using strenuous efforts to push rayon tires, knowing full well that the smaller companies would be forced out of business if the war department adopted rayon for tires as standard."

In the above article the writer has endeavored to present both sides of this very important issue, and has left the decision entirely up to the reader. Of course we cannot settle this controversy here, but the fact remains that we are in a struggle for our lives, and what the W P B in Washington orders, we must obey. We feel confident that Mr. Jeffers will adopt the best possible plan with just consideration to both sides.

—The Bobbin and Beaker—

Lt. J. L. Thompson, Textile Engineering graduate of 1941-42, is now with the Quartermaster Corp., and is stationed at Camp Gordon, Augusta, Georgia. On his recent return from Quartermaster duty in Wyoming, Lt. Thompson was married.

Our hearty congratulations and best wishes, Lester!
PROFESSOR DUNLAP DOES CARD SPEED RESEARCH WORK

(continued from page five)

speed of their cards they were able to eliminate overtime pay. Here is the confirmation of both increased production and decreased costs.

This project of Mr. Dunlap is very significant because it indicates that the textile industry, and the men who are associated with it, are becoming more conscious each day of the need for research. Textile research has provided many amazing new products, and improved methods in the past few years. New products, new methods, and original styles and fabric blends must be brought out by the manufacturers if they are to successfully compete with their fellow producers, and this applies even more so to the synthetic fiber producers. The writer has observed that there is something new being discovered all the time; to verify this one has only to scan the contents of the various textile magazines. Some mill men warn that there is coming a day when the mills must be completely modernized, or else they will be doomed.

Cotton Covering on the Slasher Squeeze Rolls

Professor Dunlap also informs us that he has under way an experiment to determine whether or not cotton can be substituted for wool on the squeeze rolls of the slasher. At present wool is very scarce, and the cost is very high. In one mill where Professor Dunlap substituted cotton blanketing for the wool roll covering, it was found that the cotton covering was not only very much more economical, but it lasted longer than the wool covering and at the same time did satisfactory work in preparing the yarn for weaving. The only obstacle which seemed to offer difficulty was the fact that the cotton fabric matted down and became hard with continued use. However, Mr. Dunlap maintains that if the cotton fabric could be taken off the roll at certain intervals and be washed it would prove very satisfactory.

We have printed here all the tabulated data on the manufacturing conditions, the characteristics of the yarn itself, and the data obtained from the tests on the yarn carried out in the Testing Laboratory of the Clemson College Textile School.

Thus, research brings forth new fruit in its never-ending toil for the betterment of our living standards. The job is being well done, Professor Dunlap, we of the Textile School congratulate you.

—The Bobbin and Beaker—

CHOOSE SYNTHETICS

(continued from page four)

rule to follow: do the best you know how on the job you are doing and study to do it better.

You who are now in school have often heard it said that you should take advantage of your oppor-
tunities while in school. Perhaps that isn’t sufficiently clear. Perhaps it should be stated that the way you do your job in school represents the training you are giving yourself as a foundation for your future. For you in textiles who will continue in this field, the record you are now making is one that you will either have to live up to or try to live down, for many years to come if not for the remainder of your natural life. That may sound strong and you may automatically say in your mind, “There are exceptions and I will be one of those exceptions,” but the chances are several thousand to one that instead you will be one of those for whom the rule holds true.

Those of you who are also taking military training with your textile and see the certainty of entering the armed service of this country may be tempted to minimize the importance of your education in regard to textiles by consciously or unconsciously saying that by the time the war is over and you return to normal living so many things in textiles will have changed. That is confusing the main point which is that you will not have changed. And it will be your relationship to the industry rather than the industry’s relationship to you that will be of greatest personal importance.

—The Bobbin and Beaker—

TEXTILE FACULTY MEMBERS CALLED INTO SERVICE

(continued from page eleven)

Tarrant have been divided among the remaining members of the faculty of the department. None of the faculty of the Yarn Manufacturing department has as yet been taken from the school.

The faculty of the Textile Chemistry department is now composed of two professors, Mr. Joseph Lindsay and Mr. E. P. Ward, and two student assistants, Cadet C. R. Howard and Cadet T. E. Croxton. The four men on the faculty of the Yarn Manufacturing department are Mr. R. K. Eaton, Mr. W. G. Blair, Mr. Gaston Gage, and Mr. D. P. Thomson. Mr. Thomson was added to the faculty last year when Mr. G. H. Dunlap was given leave of absence to conduct research work for the Southern Textile Association and the Arkwrights. Mr. A. E. McKenna, Mr. W. B. Williams Mr. T. A. Campbell, Mr. J. V. Walters, Mr. E. P. Cartee, and Mr I. S. Pitts are the remaining members of the faculty of the Weaving and Designing department.

We, the textile students, saw the problem facing our school and we have seen this problem solved rapidly and efficiently. We are very proud of the fact that the faculty is cooperating to the highest degree possible to maintain the reputation of our school as one of the leading textile schools in the nation today.
The Manufacture of Tapestries

By T. Arnold Turner, Jr., '44

As you all know, tapestries are pictures or designs which are made by interweaving colored "woof" or filling threads with undyed warp threads after the latter has been extended either vertically or horizontally upon a loom. This interweaving is done by means of an instrument known as a "broche" which is neither a shuttle nor a bobbin but works like both of them. Needles are never used in weaving tapestry. Art tapestries can only be woven by trained artists who always interpret and never copy a model. If a slight mistake is made in the process of weaving, there can be no alternative but to destroy what has already been done and start all over again. There is no similarity in hand-woven tapestries and machine-woven tapestries. Every thread of the warp is so completely encased by the filling that warp does not show on either side of the fabric. There are two kinds of tapestries: "haute-lisse," in which the tapestries are woven on an upright loom, and "basse-lisse," in which tapestries are woven on a horizontal loom. This simply means that the warp is stretched like the strings of a harp, usually twenty-two to twenty-six to an inch; but one, the "haute-lisse," has its warp turned vertically while the "basse-lisse" has its warp turned horizontal to the ground. Keep in mind that all of the "real" tapestries are woven by hand. The Gobelin Tapestries, most famous of tapestries, are woven on the "haute-lisse" looms, but the "basse-lisse" looms are about one-third faster than the "haute-lisse."

In high art "haute-lisse" tapestries, well filled with figures of people, the artist weaver can weave only about one square yard in a year! At the famous Gobelin factories today, this square yard cost about eight hundred and eighty dollars, which does not include taxes, insurance, and salary of the weavers! Nero, the great ruler of Rome, once paid two hundred thousand dollars for one yard by two yard tapestry. The weaver passes from one color to the other by using the intermediate colors so as to produce a design that looks as if it were painted on the warp. This process is called "hatching the colors," and is the most difficult task in tapestry weaving.

In both "haute and basse-lisse," the weaver works on the back side with the finished part facing away from him instead of toward him. The "haute-lisse" weave has to go around to the front of the tapestry in order to inspect his choice of colors, etc. Neither can the "basse-lisse" weaver inspect his work without going to a great deal of trouble also. The "haute-lisse" tapestries usually bring a higher price because the artistic shading is better than the "basse-lisse" tapestries.

The precautions taken by the weaver to verify the correctness and excellence of his work are of little advantage if he doesn't possess the talent, skill, and experience to insure success in his tapestries. Let it be brought to mind that he uses dry and supply materials which cannot be manipulated as readily as the liquid colors of the painter. He cannot correct, alter, or modify what he has done. Neither can he erase and reproduce it, as the painter. He cannot create harmony of colors except with the difficult task of "hatching" the right colors together; first, in his mind, then, on the warp. Is it any wonder that it takes 1 to 15 years to educate a weaver into all the tricks of the profession? It took several generations of the Gobelin family in France to perfect the art of storied tapestries. Since the design is first drawn on the face of the warp, the weaver reproduces it in the reverse. After the tapestry is finished no one can tell which is the face of the cloth with the naked eye.

Some of the oldest existing tapestries are no doubt the fragments from the Church of St. Ger
dac in Cologne, which were woven in Europe in the 11th or 12th century. The oldest of all existing tapestries was woven in Asia four hundred years B. C. and was found in Crimea. These early tapestries were usually worn on costumes for decorative purposes.

Everywhere they occupied the places of honor. Great Generals carried them to the wars; houses were decorated with them to create warmth and congeniality in the homes.

In France and Flanders, the manufacture of tapestries became nationalized. The most important weavers of France and of the world were the Gobelins. Incidentally, the factory still produces magnificent pieces of art. In 1662 the factory at Faubourg Saint Marcel was purchased by Colbert on behalf of Louis XIV. This manufacture is still carried on by the state.

There are only two museums in Europe devoted to the exhibition of tapestries and textile products exclusively. These are the Gobelins in Paris, and the Crocetia in Florence, Italy. In each museum there are over six hundred or seven hundred pieces of tapestry arranged to show the modifications at different epochs of weaving.
Abbott Machine Company
WILTON, N. H.  •  GREENVILLE, S. C.

Makers of
- Automatic Cone Winders for Warping
- Automatic Tube Winders for Twisting
- Automatic Knitting Cone Winders
- Automatic Paper Tube Winders
- Automatic Loom Bobbin Winders

QUALITY PRINTING

We are creators and producers of quality printing at reasonable prices. Prompt service given all jobs from calling cards to catalogs.

Automatic presses enable us to give you fast service at low cost. Phone 666 for an estimate. You will not be obligated.

THE SENECA JOURNAL

Seneca, South Carolina
MILL POWER SUPPLY
By J. J. McCarthy '43

(continued from page nine)

pearance of the room and the working conditions are improved somewhat when the individual drive is used.

The higher efficiency of the group drive is decreased somewhat by losses in shaft bearings and the slippage in the belt drives. There may be a saving in power costs with a group drive when the maximum demand for billing purposes is based on connected horse-power.

Thus it might be necessary because of peak loads to provide a 10 hp motor to drive a given machine. Ten such machines would require ten motors for individual drive and the demand would be based on 100 connected horse-power. It might be possible to arrange these machines for group drive and use only a 40 hp motor if the peak loads did not overlap seriously in the time of their occurrences. Thus, the demand charge for group drive would be only 1/4 of that for individual drive.

Load and Power Factors

The load factor of any mill is the ratio of the average power used in a given period to the peak power used in that period. The cost of power will be effected considerably by this load factor. A mill having a low load factor will be charged a higher rate by the power company, because the latter is required to have equipment at hand ready to supply the mill's peak requirement. Naturally this condition is going to result in an increased monthly power cost. It is to the advantage of the mill to arrange the various operations so that the peak load will be as close as possible to the average load.

Reference has already been made to the power factor. Power factor is the ratio between the actual power used by the mill and the generating capacity required to produce it. Penalties are imposed upon the mill by the power company if the power factor is low. Therefore, the management should strive to keep it as near to unity as possible. Power companies use the power demand of the mill as a basis for the bill, and at the same time they place a power factor charge if the factor is low. A consumer having a maximum demand of 100 kw. with 100% power factor would be paying the same demand charge as if he had a power factor of shall we say 50%. However, the kilovolt-ampere capacity in generating and distributing equipment required by a 100 kw. load with 50% power factor is approximately two times as great as that required for 100 kw. with 100% power factor. So, in addition to the demand charge there must be a penalty against low power factor.

The economical use of electrical apparatus demands the intelligent analysis of the many problems which are common to mill engineering in general. Some require the attention of a competent electrical engineer. There are problems involving efficiency, economic life, and other items relating to operating costs. Due attention to these problems will help considerably in maintaining a smoothly running, economical mill.

—The Bobbin and Beaker—

THE VALUE OF RESEARCH TO THE TEXTILE INDUSTRY

(continued from page three)

dew-proofing preparations, permanent water-repellent fabrics and many other products commonly used today.

The textile schools, through their graduates, are playing an important part in the development of the research program in many of our mills. Graduates in textile chemistry and engineering, in textile engineering, in yarn manufacturing and in weaving and designing have brought to the industry much needed technical training and many new ideas that have replaced rule-of-thumb methods heretofore practiced. The research laboratories of our textile schools are rendering a real service to the industry particularly to those mills which have not yet established such research departments.

The federal government, through the Cotton Branch of the Agricultural Marketing Administration, the Bureau of Agricultural Chemistry and Engineering, through the Southern Regional Research Laboratory, the National Bureau of Standards and the Textile and Clothing Section of the Bureau of Home Economics, is doing a very thorough job of establishing standards for many cotton textiles, as well as pursuing a fundamental program of fiber and spinning research. The Textile Research Institute, Inc., the Textile Foundation, the Southern Textile Association, the National Cotton Council and the Cotton-Textile Institute, Inc., and many private and public institutions are contributing much to the cotton research work being conducted in this country.

It is interesting to note that an increasing number of cotton manufacturers report today that their research departments are paying their way. Aside from developing new uses such research departments have accomplished many other notable achievements especially in the field of selection. As a result of research, products used in manufacturing are being chosen on the basis of their proved superiority for a given use. The following are some of the outstanding selections in the textile industry with respect to quality and fitness to function.

1. Selection of cotton, resulting in not only a better product but better running work and a lower manufacturing cost.
2. Selection of oils and greases.
3. Selection of size materials, gums, and starches.
4. Selection of repair parts.
CONGRATULATIONS TO

The Bobbin & Beaker

FROM ALL

ESSO DEALERS

BUY AT OUR ESSO SIGN

FOR A QUICK
AND DELIGHTFUL SNACK . . .

Try

THE CLEMSON PHARMACY
and BUS STATION

C. C. DuBOSE, Manager

BODIFORD'S

Clemson's Reliable
Cleaners and Pressers

Hoke Sloan

"An Old Clemson Man"

Crosby Square Shoes
Arrow Shirts
Botany Ties
USEFUL DATA

These data and formulae were compiled for your benefit. We suggest that you cut this page out and place it in some convenient spot where it may be easily referred to. Additional data will be published in future issues; save them for your benefit.

To find circumference of a circle multiply diameter by 3.1416.

To find diameter of a circle multiply circumference by .31831.

To find the area of a circle multiply square of diameter by .7854.

To find the area of a triangle multiply base by one-half the perpendicular height.

To find the surface of a ball multiply square of diameter by 3.1416.

To find cubic inches in a ball multiply cube of diameter by 5236.

Doubling the diameter of a pipe increases its capacity four times.

To find the pressure in pounds per square inch of a column of water multiply the height of the column by .434.

To find the capacity of tanks of any size; given dimensions of a cylinder in inches, to find it's capacity in U. S. gallons: square the diameter, multiply by the length and by .0034.

Millimeters $\times \, .03937 = \text{inches.}$
Millimeters $\div \, 25.4 = \text{inches.}$
Centimeters $\times \, .393 = \text{inches.}$
Centimeters $\div \, 2.54 = \text{inches.}$
Meters $\times \, 39.37 = \text{inches. (Act Congress)}$
Meters $\times \, 3.28 = \text{feet.}$
Meters $\times \, 1.094 = \text{yards.}$
Square Millimeters $\div \, 645 = \text{square inches.}$
Square Centimeters $\times \, .155 = \text{square inches.}$
Cubic Centimeters $\div \, 16.387 = \text{cubic inches.}$
Cubic Centimeters $\div \, 29.57 = \text{fluid ounces.}$
Cubic Meters $\times \, 35.314 = \text{cubic feet.}$

Cubic Meters $\times \, 1.308 = \text{cubic yards.}$
Cubic Meters $\times \, 264.2 = \text{gallons. (231 cu. in.)}$
Grams $\times \, 15.432 = \text{grains. (Act Congress)}$
Grams (water) $\div \, 28.35 = \text{fluid ounces.}$
Grams $\div \, 28.35 = \text{ounces avoirdupois.}$
Kilogram Meters $\times \, 7.233 = \text{foot pounds.}$
Kilograms per cubic Meter $\times \, .026 = \text{lbs. per cu. ft.}$
Kilowatts $\times \, 1.35 = \text{H. P.}$
Watts $\div \, 746 = \text{H. P.}$
Watts $\div \, 737 = \text{ft. lbs. per sec.}$
Moisture content $= \text{total weight - bone dry weight} \div \text{total weight.}$
Regain $= \text{total weight - bone dry weight} \div \text{bone dry weight.}$
Yards $\times \, 3.333 = \text{wt. in grains = hank number.}$
$100 \div \, 12 \times \text{grain silver number = hank roving number.}$
Calculated count $- \text{actual count} \times 100 \div \text{calculated count} = \% \text{contraction.}$
Staple allowance $= \frac{\text{dia. rolls}}{2} = \text{gauge for setting rolls.}$
Mechanical Draft $= \text{Surface speed of delivery roll} \div \text{surface speed of feed roll.}$
Draft Constant $= \text{Draft} \times \text{Draft gear.}$
Wgt. fed $\div \text{wgt. delivered} = \text{resultant draft.}$
Twist per inch $= \text{twist multiplier} \times \text{square root of hank rov.}$
Twist per inch $= \text{R. P. M. of spindle} \div \text{surface speed of front roll in inches.}$
Twist per inch $= \text{twist constant} \div \text{twist gear.}$
Shrinkage $= \text{reed width} \div \text{twist gear.}$
Per Cent shrinkage $= \text{shrinkage} \div \text{reed width.}$
Total dents $= \text{width in reed} \div \text{dents per inch.}$
Ozs. $\times \, 437.5 = \text{grains.}$
Just a few cents worth removes the starch from hundreds of yards of cotton and mixed cotton fabrics

Desize with Exsize

Exsize is a liquid concentrate of enzymes that removes starch gently and naturally. Because it is fast and thorough in action it reduces the amount of chemicals needed for bleaching and dyeing and permits this reduced quantity to be more efficient.

Exsize contains no chemicals or alkalis to injure the finest fabrics. For further, complete information send for FREE booklet—today!

Our laboratory facilities and practical field men are available to help you with desizing problems.

PABST SALES COMPANY
CHICAGO, ILLINOIS

Warehouses at New York, and Textile Warehouse Co., Greenville, S. C.
GREENVILLE TEXTILE SUPPLY COMPANY
GREENVILLE, SOUTH CAROLINA